A STUDY OF THE IMPACT OF RISK FACTORS ON PORTFOLIO RETURNS

SYNOPSIS SUBMITTED

by

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DECLARATION

I hereby declare that the synopsis entitled "**Finding a Place For Momentum In The Fama-French Five Factor Model**" is my own original work and it has not formed the basis for the award of any degree, diploma, associateship or fellowship of similar other titles.

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BACKGROUND AND LITERATURE REVIEW

The business world has for long been fascinated with establishing and testing models that can forecast stock performance with a strong degree of certainty. The central topic for this research traces its origins to the ground breaking work done by Modigliani-Miller and Markowitz. Harry Markowitz (1952) proposed the "Modern Portfolio Theory" wherein he postulated that it is possible to construct an "efficient frontier" of portfolios that can offer maximum returns for a certain level of risk. He further argued that the risk and return characteristics of an investment should not be viewed in isolation but rather be evaluated by how it affects the portfolio's overall risk and return. Franco Modigliani and Merton Miller, who from hereon will be referred to as MM, were pioneers in studying the impact, if any, that the composition of a firm's Capital Structure may have on its value and the conditions which govern those outcomes in their seminal work argue that the firm value neither depends on it's dividend policy nor on the firm's decision to finance by issuing stock or selling debt. Thus, concluding that a firm's valuation is not affected by its capital structure. A subsequent research paper along the same lines published in 1963 reinforced the aforementioned findings of their previous paper that investment projects are independent of the mode of financing chosen. They also found that the cost of equity funds was only 25 percent higher than that of debt, as opposed to being five times higher as was the common understanding at that point. Furthermore, they add that the benefits of debt financing on shareholder return are small. Since then, a vast amount of research has devoted itself to understanding how capital structure

decisions are made and identifying various factors that influence the capital structure of a firm. The two most significant theories to have come about as a result research into the aforementioned, and that forms the foundation for most of the literature available on capital structure studies, are the Trade-Off theory and the Pecking Order theory (Myers, 1984). A subsequent paper by Myers (July, 1984) promulgated a modified Pecking Order to explain the factors that govern a firm's financing priorities and was aimed at the shortcomings that he saw in his previous papers. Another commonly held belief is that managers evaluate the riskiness of a project, estimate cash inflows and then select a source of finance that will maximize earnings per share (Damodaran, 2011). Others believe managers have the responsibility to identify the optimal structure, i.e. the mix of debt and equity in the capital that helps in maximizing firm value. (Groth,1997). It is safe to say that the capital structure conundrum still remains and opinions are still divided as to what drives a firm to choose a particular mode of financing; whether firms follow a pecking order when choosing a source of finance or do they target a specific debt-equity ratio when taking capital structure decisions. It would also not be an exaggeration to state that the subsequent development of the Capital Asset Pricing Model, or CAPM for short, was a consequence of the works done in this direction by MM and, in particular, Harry Markowitz.

The CAPM was developed by Sharpe and Lintner to demonstrate the relationship between excess portfolio returns and excess market returns. The model considers Beta as a proxy for the systematic risk and the only variable that is significant in predicting stock returns. It caught the fancy of Academia and the Business world alike, and became the first general equilibrium model to define a linear cross-sectional association between market beta and expected return. However, Jensen et al (1972) empirically tested the CAPM to conclude that the expected excess return on a security was not strictly proportional to market Beta, thus rejecting the traditional form of the CAPM.

Thereafter, other scholars and researchers have chipped in by conducting various studies to evaluate the nature of relationship that may exist between stock returns and a host of other factors. Thus, heralding the start of an era that has seen a vast amount of research aimed at testing and contradicting the CAPM by identifying other factors that also have a significant influence over stock performance. Basu (1977) empirically tested the performance of equity securities and their relationship, if any, with their P/E ratios for the period April 1957 to March 1971 to conclude that the prices of stock did not completely reflect the information content of P/E ratios as rapidly as postulated by the semi-strong form of the efficient market hypothesis for the time period of study. Stattman (1980) found that firms having high Book-to-Market ratios realized higher returns on average compared to firms with low Book-to-Market ratios, thus identifying a positive relationship between book values and stock returns. Banz (1981) empirically studied the relationship between returns and the total market value of stocks listed on the NYSE to conclude that market equity significantly affects the average returns and that is evidence that the CAPM is wrongly specified. Bhandari (1988) concluded that there exists a positive relationship between common stock returns and the debt equity ratio even after controlling for firm size and beta, suggesting that the "premium" associated with debt/equity ratio is not just some "risk premium". Similar studies continue to be conducted to this day. Welch (2010) concludes that stock returns are a first order determinant of debt ratios, thus having an impact on capital structure. Korteweg (2010) found negative relationship between leverage and stock returns. Similarly, Ozturk and Yilmaz (2015) examine the effects of leverage on stock returns and conclude that leverage has a negative impact on stock returns.

The aforementioned studies served to cast aspersions over the strength of a single-factor model in explaining stock returns, doubts that persist to this day specifically in case of the CAPM and thus

we witnessed the push for a multi-factor model capable of explaining excess of stock returns. Fama and French (1992, 1993, 1995 & 1996), conducted studies using thousands of random stock portfolios to come up with a three factor model as an asset pricing tool, suggesting that firm size and value, when combined with the market beta factor, could explain as much as 95 % of the portfolio return. At around the same time, Jegadeesh and Titman (1993) found strong evidence to suggest that stocks performing in a certain manner over a three to twelve month period continued showing the same performance over the subsequent three to twelve month period. Thus, they identified momentum as an important factor influencing stock returns. Thereafter, Carhart (1997) made an attempt to improvise upon the Fama-French Three Factor Model by introducing Momentum as a fourth factor in addition to Market Beta, Firm Size and Value. Studies continued to consistently find strong evidence in favor of momentum having a significant influence over stock returns. Sapp-Tiwari (2004) find evidence from the US mutual fund market that suggests that investors simply chase funds that had good returns in the past. Teplova-Mikova (2015) find evidence from the Japanese market in favor of momentum as a significant influence on stock returns. Lim et al. (2018) found a significant and persistent effect of time-series momentum in common stock returns in the US markets for a nearly 100-year period, from 1927 to 2017. Such findings further strengthened voices critical of the Fama-French Three factor model. In view of the burgeoning evidence suggesting that the 3-factor model was insufficient in accurately describing the cross section of stock returns, Fama and French (2015) then came up with the Five-Factor model, adding Investment and Profitability as two more factors to the erstwhile Three-Factor model as a much better tool to explain stock returns. They do add that the Value factor in their Three-Factor model is rendered redundant with the addition of Investment and Profitability factors. However, they continue to exclude Momentum factor as it disagrees with the Efficient

Market Hypothesis. It is precisely for this reason, among various others;that Five-factor model is being questioned for robustness by Blitz, Hanauer, Vidojevic and Vliet (2018).

To summarize the above review of literature, the jury is still out on the validity and robustness of the Five-Factor model as an improvement over the earlier Three-Factor model as the benchmark asset pricing tool. The critique is primarily centered on the persistence with which Fama-French continue to ignore momentum as an important factor in asset pricing despite strong evidence that they themselves find in its favor (2012).

RESEARCH GAP

The commonly held belief is still that momentum affects small cap firms more than the large cap ones and short positions rather than long ones. However, evidence seems to suggest otherwise. Thus, we believe there is a strong case to empirically test and evaluate if a reworked Five-Factor model, one that incorporates a Momentum factor and sheds the Value factor from the FF three-factor model, would do a better job as an asset pricing tool in comparison to the existing one. Furthermore, we also aim to test and compare the performance of various Asset-Pricing models, along with the one we propose, in pricing of equities in the Indian Stock market.

RATIONALE OF THE STUDY AND OBJECTIVES

Since Fama-French adapted their Three-Factor model to incorporate Profitability and Investment as factors, which henceforth came to be known as the Fama-French Five-Factor model, there hasn't

been any study to ascertain the strength of this model in explaining anomalies in stock returns in the Indian market. Furthermore, we also believe there is a strong case for including a Momentum as a factor in the Five-Factor model in order to establish if it can do a better job at explaining excess stock returns in comparison to the existing asset-pricing models in vogue.

This study will be conducted keeping in mind the following objectives:

- To analyze the impact of Momentum on stock returns in the Indian Stock Market.
- To ascertain if an improvised Five Factor-model, arrived at by adding a Momentum factor to the existing Fama-French Five-Factor model and removing the Value factor, is a better tool at explaining excess portfolio returns in comparison to the existing Five-Factor model as proposed by Fama-French.
- To examine the degree of adequacy of the existing Fama-French Five Factor model in explaining excess stock returns in the Indian Stock market.
- To compare the strengths of a Six Factor Model over the Five Factor model in explaining excess returns.

HYPOTHESES

Based on the above mentioned objectives, we propose the following hypotheses:

- Momentum has significant explanatory power in stock returns.
- The Five-Factor model as proposed in this study sufficiently explains excess portfolio returns.
- An alternative Six-Factor model, as proposed in this study, significantly influences portfolio returns.

The study will be descriptive in nature and econometric modeling will be used to establish the dynamics of the relationship sought to be defined. The study will compare the performance of the following three models:

$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \varepsilon_{it}$------**eq. (i)**

Equation (i) is the Fama-French Five Factor model as we know it.

$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 RMW_t + \beta_4 CMA_t + \beta_5 MOM_{it} + \varepsilon_{it}$------**eq. (ii)**

Equation (ii) represents an improvised Five-Factor model arrived at by adding a Momentum factor to and removing Value factor from the existing Fama-French Five-Factor model.

$R_{pt} - R_{ft} = \alpha_{it} + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 MOM_{it} + \varepsilon_{it}$----**eq. (iii)**

Equation (iii) is the Six-Factor model that we propose by adding Momentum to the Fama-French Five-Factor model.

R_{pt} Portfolio returns at time *t*

R_{ft}Returns on risk-free securities at time *t.*

R_{mt}Market returns at time *t.*

SMB_tSmall minus Big.

MOM_{it}Momentum.

HML_tHigh minus Low.

RMW_tRobust minus weak and a proxy for Profitability.

CMA_tConservative minus Aggressive, a proxy for Investment.

The study will be descriptive and exploratory in nature. Various tests will be conducted to identify the most appropriate econometric modeling to be applied when analyzing the data and to identify if the model suffers from heteroscedasticity. Various Causality tests will be run to study the significance of any relationship identified.

RESEARCH METHODOLOGY

Data will consist of monthly closing prices of stocks listed on the NSE after factoring in adjustments for stock splits and dividends. Moreover, appropriate measures will be taken to ensure that stocks being considered have been filtered for liquidity. In other words, illiquid stocks will not be a part of the study. Tests will also be conducted for ascertaining stationarity of the data collected. 90 day T-bill rates or similar shall be taken as a proxy for the Risk-free rate of return. The data collected will then be used to form portfolios sorted for Size, Value, Profitability, Investment and Momentum. Appropriate regression models and descriptive statistics will then be used to analyze the data and draw conclusions.

SIGNFICANCE OF THE STUDY

Our study aims to identify the sufficiency of the Fama-French Five-Factor model in explaining excess stock returns and whether the model proposed in this study better explains the excess portfolio returns. This will not only add to the existing body of literature related to the factors that determine stock returns but also be of great aid to investors and portfolio managers in formulating the optimum portfolio.

LIMITATIONS OF THE STUDY

We only study the Indian Markets, and that too only the National Stock Exchange. Further scope exists for conducting a study of similar nature across different countries to check for consistency and robustness. Moreover, Fama-French used a 60-year period for their study whereas we only use a 25-year period of study, from 1996-2016. Also, different time periods can also be used for the study to ensure robustness.

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